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AN IMPROVED CONTAINER FOR SHIPPING ADULT PARASITES

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During the past four years a shipping cage has been developed and used at the Moorestown, N. J., laboratory for oriental fruit moth parasite investigations which has proved satisfactory under a considerable range of conditions. It has been used to ship medium-sized Ichneumonidae and Braconidae of such genera as Dioctes, Cremastus, Glypta, Macrocentrus, Bassus, and Orgilus, as well as small Tachinidae. Shipment of these cages has been made in refrigerated containers by railway express as far as the Mississippi River, and in unrefrigerated packages by air express to points as far away as the Pacific Coast, Costa Rica, and Puerto Rico. Many of these shipments have been made during hot summer months with a mortality in transit of less than 1 percent. During 1935 the average mortality in transit was 4.8 percent. For the type of parasites handled on this project, the shipping cage will accommodate from 300 to 500 adult parasites without evidence of overcrowding.

The cage is a small rectangular box 7-3/4 inches long and 3-3/4 inches by 3-3/4 inches at the ends (fig. 1.). The two sides and the ends are constructed of half-inch white pine. The back is of strong, unbleached muslin tacked and shellacked to the wooden frame. The front is constructed as a slide fitting into a groove at the sides and one end of the box. The slide is a wooden frame of white pine covered with muslin like the back. All wooden parts are impregnated with hot paraffin. In the center of the top there is a hole 1 inch in diameter for loading the parasites. On one side four small holes are drilled, and stiff waxed twine is laced in such a manner as to provide two loops for receiving the small water bottle. On the other side a similar loop is provided to hold a lump of sugar.

When the cage is prepared to receive parasites it is equipped with a small water bottle, food in the form of lump sugar, and a bit of loose clean excelsior. If the cage is to be subjected to high humidity, an agar-sugar preparation will be a more satisfactory food. This food is described in ET-91. The water bottle is a 2-dram homeopathic vial with a rather small neck. It is filled with water, then a piece of No. 2 absorbent cotton roll is inserted, just long enough to clear the top of the vial. The roll will absorb most of the water in the bottle, and if placed in a vial with a small neck it cannot be readily jarred out of the vial from any position. It will provide enough water for several days in transit. The water bottle is easily fastened in

place by inserting it in the loops provided, pulling the twine taut about the base and the neck, and staying the twine from loosening by wedging it in the hole through the box with a tack. The lump sugar is fastened in the same manner. The loose excelsior provides additional "roosting space" for parasites and prevents their being thrown violently against the sides and bottom when loading. When the food, water, and excelsior have been arranged, the slide is put in place and fastened with a heavy rubber band cut from a discarded inner tube. The box is then loaded with parasites, and the hole at the top closed with a cork stopper. The unit shipping container (fig. 2) is then ready to be packed in a refrigerated container, or, when wrapped in corrugated paper and wet absorbent cotton, to be shipped unrefrigerated by air express.

Some of the apparent advantages of this cage are that it is staunch, not being easily crushed or broken, that it is easily prepared for receiving parasites, and is easily loaded. When the parasites are liberated, the slide can be removed, the water bottle, lump sugar, and excelsior taken out, and the interior quickly cleared of parasites. Mortality counts are easily made of the dead remaining in the box. The rectangular shape of the box makes it easy to combine in one package two to many units, so arranged that each unit can receive a reasonable amount of air. The combination of wood and cloth provides a container in which undesirable condensation of water droplets, dangerous to small insects, is practically eliminated. It also effectively prevents the accumulation of any metal oxides which might be more or less poisonous to insects contained.

In preparing a package for air express shipment, the unit containers are tied together in such a manner that at least one cloth surface is faced toward the outside of the parcel. The package is then wrapped with one layer of corrugated paper. Over this are placed two layers of absorbent cotton. An outside covering of unbleached muslin is tightly stretched and sewed at the margins to complete a neat, nearly insect-tight wrapping for the parcel. After completing the wrapping, water is sprinkled freely over all surfaces of the package until the absorbent cotton is well wetted. The amount of water to be used will depend upon the probable evaporation during transit, being greater when the trip is of long duration, the temperature high, or the humidity low, but in any case it should be less than enough to produce oozing of free water under the usual pressures exerted on the wet cotton wrapping.

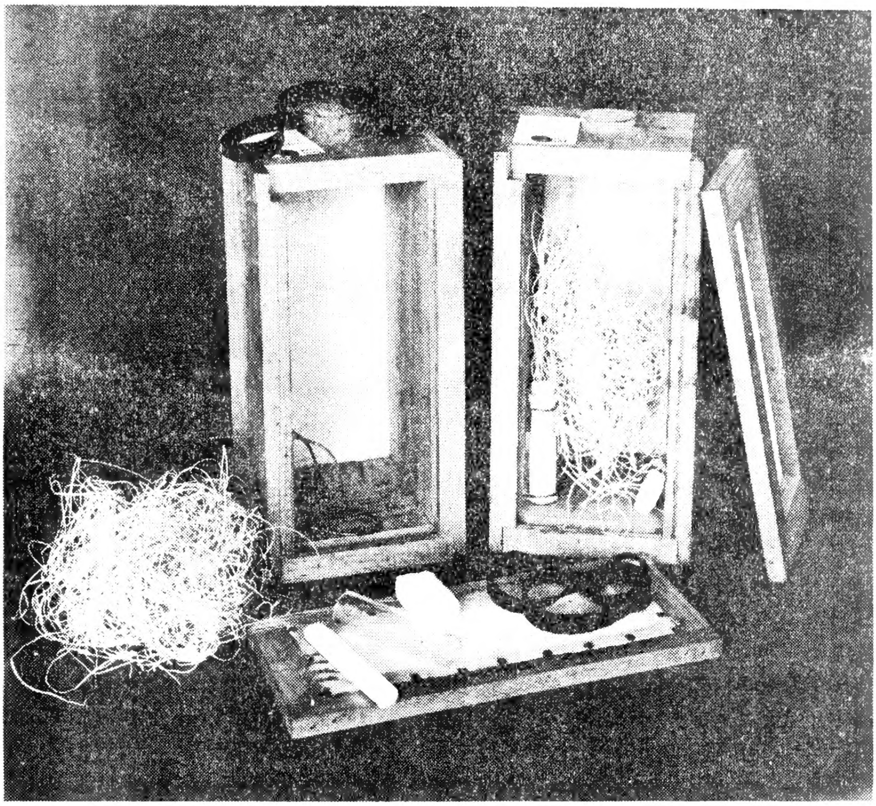

Figure 1.--Details of construction of the shipping cage.

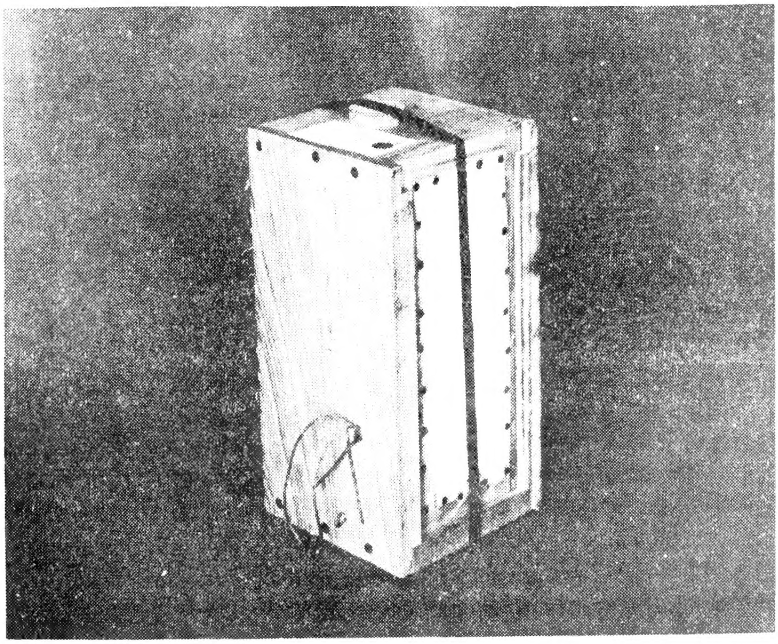

Figure 2.--A cage ready for shipment.